

Borehole

**50-06-16****Log Event A****Borehole Information**

Farm : <u>T</u>	Tank : <u>T-106</u>	Site Number : <u>299-W10-167</u>
N-Coord : <u>43,520</u>	W-Coord : <u>75,799</u>	TOC Elevation : <u>671.12</u>
Water Level, ft : <u>85.3</u>	Date Drilled : <u>7/31/1975</u>	

**Casing Record**

Type : <u>Steel-welded</u>	Thickness, in. : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>90</u>	
Type : <u>Steel-welded</u>	Thickness, in. : <u>0.322</u>	ID, in. : <u>8</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>90</u>	
Type : <u>Steel-welded</u>	Thickness, in. : <u>0.365</u>	ID, in. : <u>10</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>67</u>	

Cement Bottom, ft. : <u>90</u>	Cement Top, ft. : <u>0</u>
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**Borehole Notes:**

Borehole 50-06-16 was drilled in July 1975 to a total depth of 126 ft. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. The borehole was telescoped to total depth using 10-in., 8-in., and 6-in. casings. The 10-in. and 8-in. casings were installed to depths of 67 and 90 ft, respectively, and the 6-in. casing was advanced to 125 ft. In October 1977, the 6-in. casing was retracted to a depth of 90 ft and the resultant open borehole below the bottom of the 6-in. casing was backfilled with grout. No information concerning perforations was provided in the drilling log or Chamness and Merz (1993). However, the drilling log states that this borehole was "cemented," implying that the annular space between the 6-in., 8-in., and 10-in. casings was filled with grout. The thicknesses of the 6-in., 8-in., and 10-in. casings are presumed to be 0.280 in., 0.322 in., and 0.365 in., respectively, on the basis of the published thickness for schedule-40, 6-in., 8-in., and 10-in. steel tubing.

**Equipment Information**

Logging System : <u>2B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>11/1997</u>	Calibration Reference : <u>GJO-HAN-20</u>	Logging Procedure : <u>MAC-VZCP 1.7.10-1</u>

**Logging Information**

Log Run Number : <u>1</u>	Log Run Date : <u>02/26/1998</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>200</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>34.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

Borehole

**50-06-16****Log Event A**

Log Run Number :	<u>2</u>	Log Run Date :	<u>02/27/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>86.0</u>	Counting Time, sec.:	<u>200</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>44.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>3</u>	Log Run Date :	<u>02/27/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>45.0</u>	Counting Time, sec.:	<u>200</u>	L/R : <u>R</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>33.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

**Logging Operation Notes:**

This borehole was logged by the SGLS in three log runs using a 200-s counting time. The top of the borehole casing, which is the zero reference for the SGLS, is approximately flush with the ground surface. The total logging depth achieved was 86.0 ft.

High dead time (greater than 35 percent) was encountered during log run two at a depth of 44 ft. As a result, log run three was logged in real time from 45 to 33 ft.

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**Analysis Information**

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Analyst : E. LarsenData Processing Reference : MAC-VZCP 1.7.9Analysis Date : 07/06/1998**Analysis Notes :**

The pre-survey and post-survey field verification for each logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

This borehole is triple cased with 6-in.-, 8-in.-, and 10-in.-diameter casings to a depth of 67 ft and double cased with 6-in.- and 8-in.-diameter casings from 67 to 90 ft. A casing correction factor for a 0.98-in.-thick steel casing was applied to the concentration data collected from the ground surface to 67 ft because it most closely matched the 0.967-in. total combined thickness of the triple casing. A casing correction factor for a 0.65-in.-thick steel casing was applied to the concentration data collected from 67 to 90 ft because it most closely matched the 0.602-in. total combined thickness of the double casing. The entire annulus between the 6-in., 8-in., and 10-in. casings is most likely filled with grout, making calculation of accurate radionuclide concentrations impossible. However, man-made and natural radionuclides were identified and apparent concentrations are reported.

Approximately 1 ft of water has collected inside the bottom of this borehole. The appropriate water correction factor was not available, so no compensation was applied to the water-filled interval. This resulted in lower reported man-made and natural radionuclide concentration values between 85 and 86 ft.

**Log Plot Notes:**

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides

Borehole

50-06-16

Log Event A

can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the estimated uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

A time-sequence plot of the historical gross gamma log data from 1975 to 1994 is presented with the SGLS log plots.

#### **Results/Interpretations:**

The radionuclide concentrations identified in this section are reported as only apparent concentrations and are underestimated.

A zone of high dead time (greater than 80 percent) occurred from 35.5 to 40.5 ft. Although the accuracy of the radioassays collected within this interval is limited, the spectra were reviewed and some were found to be usable for radioassay calculations and are included on the log plot.

The man-made radionuclides Cs-137, Co-60, Eu-154, and Eu-152 were detected by the SGLS. The Cs-137 contamination was detected continuously from the ground surface to 27 ft and from 28.5 to 43 ft. Isolated occurrences of Cs-137 were detected at 44 ft and the bottom of the logged interval (86 ft). The Co-60 contamination was measured from 34 to 35 ft and continuously from 41 ft to the bottom of the logged interval. The Eu-154 contamination was detected nearly continuously from 33.5 to 73.5 ft and from 78 ft to the bottom of the logged interval. A few occurrences of Eu-154 were detected between 75 and 76.5 ft. The Eu-152 contamination was measured nearly continuously from 41.5 to 69 ft.

Almost all of the K-40 and Th-232 concentration values are absent between 34 and 44 ft. All of the U-238 concentrations are absent from 14 to 20.5 ft and 33.5 ft to the bottom of the logged interval.

The K-40 and Th-232 concentration values increase from about 78 ft to the bottom of the logged interval.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank T-106.